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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/069,058

08/27/2002

Thierry Barge

4747-4600

9030

28765

7590

08/27/2004

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PATENT DEPARTMENT
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EXAMINER

PIZARRO CRESPO, MARCOS D

ART UNIT

PAPER NUMBER

2814

DATE MAILED: 08/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/069,058	Applicant(s) BARGE ET AL.	
	Examiner Marcos D. Pizarro-Crespo	Art Unit 2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 June 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 14-28 is/are pending in the application.
- 4a) Of the above claim(s) 18-23 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 14-17 and 24-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 14-28 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Application/Control Number: 10/069,058 (Final Rejection)
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Attorney's Docket Number: 4747-4600

Filing Date: 8/27/2002

Claimed Foreign Priority Date: 8/17/2000 (371 PCT/FR00/02330)
8/20/1999 (FR 99/10667)

Applicant(s): Thierry Barge, et al.

Examiner: Marcos D. Pizarro-Crespo

DETAILED ACTION

This Office action responds to the amendment in paper no. 4 filed on 6/15/2004.

Election/Restrictions

1. This application contains claims 18-23 drawn to an invention nonelected with traverse in paper no. 2. A complete reply to the final rejection must include a cancellation of the nonelected claims or other appropriate action (37 CFR 1.144). See MPEP § 821.01.

Acknowledgment

2. The amendment in paper no. 4, filed 6/15/2004, responding to the Office action in paper no. 3, mailed on 4/6/2004, has been entered. The present Office action is made with all the suggested amendments being fully considered. Accordingly, pending in this Office action are claims 14-28.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 14, 15, and 27 are rejected under 35 U.S.C. 102(b) as being anticipated by Moriceau.

5. Regarding claim 14, Moriceau (see, e.g., pp.37/ll.14-19) shows all aspects of the instant invention including a process for treating a substrate that have a working layer with a free surface thereof, which process comprises annealing the substrate under a reductive atmosphere to assist in smoothing the free surface and then chemical mechanical polishing the free surface.

6. Regarding claim 15, Moriceau (see, e.g., pp.37/ll.14-19) shows that the reductive atmosphere may include hydrogen.

7. Regarding claim 27, Moriceau (see, e.g., pp.37/ll.29) shows that the free surface has a final rms roughness of between 0.8 and 1.5 angstroms.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation

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under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moriceau in view of Aga (EP 0917188).

11. Regarding claims 16 and 17, Moriceau shows most aspects of the instant invention (see, e.g., paragraph 5 above). In addition, Moriceau (see, e.g., pp.37/ll.17) shows that the annealing may be conducted for up to an hour. Aga (see, e.g., abstract), on the other hand, teaches that limiting the Moriceau's annealing time to less than 60 seconds will eliminate the COPs in the substrate.

Accordingly, it would have been obvious at the time of the invention to one of ordinary skill in the art to limit Moriceau's annealing time to less than 60 seconds, as suggested by Aga, to eliminate the COPs in the substrate.

12. Claims 14 and 24-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okonogi (EP 0917193) in view of Moriceau and Ghandhi.

13. Regarding claim 14, Okonogi shows (see, e.g., par[0027]) most aspects of the instant invention including a process for treating a substrate that have a working layer with a free surface thereof, which method comprises polishing the free surface.

Okonogi, however, fails to specify the polishing technique that he used. Ghandhi (see, e.g., pp.726), on the other hand, teaches that chemical mechanical polishing is a

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simple polishing step that may be used to achieve truly global planarization over an entire substrate.

Okonogi also fails to teach a method step before the polishing step comprising annealing the substrate under a reductive atmosphere to assist in smoothing the free surface of the substrate. Moriceau (see, e.g., pp.37/ll.10-12), on the other hand, teaches that said annealing step could soften the free surface and reduce surface micro-defects and surface region micro-defects.

Accordingly, it would have been obvious at the time of the invention to one of ordinary skill in the art to include before Okonogi's polishing step a step of annealing the free surface of the substrate under a reductive atmosphere, as suggested by Moriceau, to reduce the surface micro-defects and the surface region micro-defects.

In addition, it would have been obvious at the time of the invention to use chemical mechanical polishing for the polishing step of Okonogi, as suggested by Gandhi, to achieve truly global planarization over the entire substrate.

14. Regarding claim 24, Okonogi shows that the working layer is provided by implanting atoms into a wafer to form a weakened atom implantation zone that defines the working layer (see, e.g., par[0024]), bonding the wafer to the substrate (see, e.g., par[0025]) and then detaching the working layer from the wafer along the weakened zone to transfer it to the substrate (see, e.g., par[0026]).

15. Regarding claim 25, Okonogi shows that the working layer is made of a semiconductor material (see, e.g., par[0024]).

16. Regarding claim 26, Okonogi shows that the working layer is made of silicon (see, e.g., par[0024]).

17. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Malik (US 2002/0173872) in view of Aga.

18. Regarding claim 28, Malik (see, e.g., fig. 1A) shows most aspects of the instant invention including a process for treating a substrate **12** that have a working layer with a free surface **10** thereof, which process comprises annealing the substrate under a reductive atmosphere that includes hydrogen to assist in smoothing the free surface (see, e.g., par[0053]), followed by chemical mechanical polishing of the free surface (see, e.g., par[0054]) to provide it with a final rms roughness of between 0.8 and 1.5 angstroms so that it is ready for processing (see, e.g., par[0030]).

Malik, however, fails to specify the annealing conditions that he used. Aga (see, e.g., par[0029]), on the other hand, teaches that annealing at a temperature between 1100° and 1300°C for less than 3minutes enable the reduction of the COP density on the free surface of Malik's substrate to substantially zero.

It would have been obvious at the time of the invention to one of ordinary skill in the art to use a temperature between 1100°C and 1300°C for less than 3 minutes in the annealing step of Malik, as suggested by Aga, to substantially eliminate the COP density on the free surface of the substrate.

Response to Arguments

19. The applicants argue:

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Moriceau does not teach combining hydrogen annealing with chemical mechanical polishing. Rather, Moriceau teaches that hydrogen annealing is an alternative to chemical mechanical polishing.

The examiner responds:

The examiner agrees with the applicants that Moriceau teaches that hydrogen annealing is an alternative to chemical mechanical polishing. In his discussion, Moriceau (see, e.g., pp.37/ll.10-12) teaches using hydrogen annealing to soften SOI surfaces as it is performed in bulk silicon applications. In discussing the experimental procedure, however, he further specifies that he is applying the hydrogen anneal step to two different types of wafer, a rough wafer and a ready-to-be-used wafer (see, e.g., pp.37/ll.14-15). In his description of the rough wafers, he defines that these are wafers in which a final touch-polishing step is pending (see, e.g., pp.37/ll.14). In other words, Moriceau is performing the hydrogen anneal before final touch polishing of the wafers (see, e.g., pp.37/ll.14). Touch polishing, on the other hand, involves mechanical cleaning and scrubbing using a CMP apparatus (see, e.g., Kang/col.9/ll.35-37 and Maszana/pp.130/ll.7).

20. The applicants argue:

None of the references in the combination of Okonogi, Ghandi, and Moriceau provides any teaching that a combination of hydrogen annealing and polishing would result in an overall reduction in surface roughness, therefore, there is no reasonable expectation of success in combining the references.

The examiner responds:

See figures 2(a) and 2(b), where Moriceau clearly shows said overall reduction in surface roughness.

Conclusion

21. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

22. A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

23. Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission. Papers should be faxed to Art Unit 2814 via the Art Unit 2814 Fax Center. The faxing of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2814 Fax Center number is **(703) 872-9306**. The Art Unit 2814 Fax Center is to be used only for papers related to Art Unit 2814 applications.

24. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Marcos D. Pizarro-Crespo** at **(571) 272-1716** and between the hours of 9:30 AM to 8:00 PM (Eastern Standard Time) Monday through

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Thursday or by e-mail via Marcos.Pizarro@uspto.gov. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy, can be reached on (571) 272-1705.

25. Any inquiry of a general nature or relating to the status of this application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

26. The following list is the Examiner's field of search for the present Office Action:

Field of Search	Date
U.S. Class / Subclass(es): 438/4,406,455-459,471-477,692,795-799,974,977; 117/2; 156/610	8/16/2004
Other Documentation:	
Electronic Database(s): EAST (USPAT, EPO, JPO, PGPub)	8/16/2004

MDP/mdp
August 17, 2004

LONG PHAM
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